

# THE DYNAMICS OF DEFORESTATION: EVIDENCE FROM COSTA RICA

Suzi Kerr (Motu Economic Research)  
Alex Pfaff (Columbia University)  
Arturo Sanchez (University of Alberta)  
*June 18, 2000*

## Abstract

In this paper we estimate deforestation patterns (across time and 436 districts within Costa Rica) with an econometric method explicitly derived from a dynamic microeconomic model. While the underlying model is similar to that used by Stavins and Jaffe 1990, we use different econometric tools which permit us to condition on previous optimal selection of land as well as a plot's current forest/clearing status, and allow for dynamic adjustments of unobserved variables. As our coefficients are estimated from forest transitions, this yields a theoretical basis for deforestation regressions in which the estimated coefficients can be linked to theory. Our methodology is most naturally applied to plot data, but can be applied to aggregates including districts (as in this paper) or even to countries.

The paper starts with a model of individual land use choices. It then discusses how these decisions will change over time in response to observable and unobservable economic factors. As usual, the effects of unobservable factors lie behind error distributions, and allow us to derive a testable econometric model. Both the model and the econometric analysis explicitly recognize that, because of unobservable adjustment costs and other endogenous but unobservable economy wide changes in the profitability of land clearing, the observed level of forest at a given time is likely to differ from the equilibrium level predicted by complete adjustment to the vector of observable independent variables (i.e., factors that affect relative returns from production using cleared versus using forested land). Observed forest levels (for districts) move gradually toward long-run equilibrium as well as responding to shocks in the level of the equilibrium resulting from changes in the factors that drive relative returns. This dynamic adjustment process means current district deforestation rates are conditional on past deforestation.

The results could be used not only to understand deforestation and agricultural extensification patterns, but also as the basis for creating carbon baseline projections. The Kyoto Protocol requires credible baseline estimates in order to allow the Clean Development Mechanism to provide credit for avoided deforestation without damaging the integrity of the global climate change effort.

1999-00 Discussion Papers  
Economics Department, Columbia University

11/1/00

Series no.	Title	Authors
0001-01	The Dynamics of Deforestation: Evidence from Costa Rica	Kerr, S. Pfaff, A.